4.12 Learning Aim A – Selection

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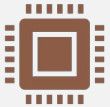
Learning Objectives

To understand how to program selection.

To be able to select the appropriate selection statement for a given logical problem.



To be able to apply arithmetic or logical operators.

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Comparing Languages

We are now going to start programming.

As part of your assignment, for merit and distinction you will need to look at a program written in two or more languages.

We will look at how programs are implemented in C# , VB.NET and Python.

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Introduction to Selection

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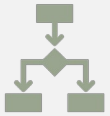
What is Selection



This is the process of making a choice or decision.

This is when the program needs to ask a question.

The answer will determine what the program does next.

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Selection Statements

- There are four types of selection:
- If statements.
- If..Else statements.
- If Else if Else statements
- Switch Case statements.

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Logical and Relational Operators.

Operators help define the question.

These can be Logical or Relational.

Relational questions will **COMPARE** two values.

The answer will either be **TRUE** or **FALSE**.

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Logical Operators

- Logical operators allow smaller statements to be combined together.
- This will allow the creation of larger statements.
- The answer will still either be TRUE or FALSE.
- For example, if **BOTH** the sun is shining **AND** the alarm has gone off are TRUE…
- I will get out of bed.

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Relational Operators.

Operator	Meaning	Example	Result
==	Is one thing the same as the other?	“FRED” == “fred”	**FALSE**. One is in capitals, the other is not.
!=	Is one thing NOT the same as the other	“FRED” ! = “fred”	**TRUE**.They are both different.
>	Is one thing GREATER THAN something else	45 > 22	**TRUE**. 45 is bigger than 22.
<	Is one thing LESS THAN something else	13 < 5	**FALSE.** 13 is not less than 5
>=	Is one thing GREATER THAN OR EQUAL TO something else	13 > = 13	**TRUE** 13 is equal to 13, which is correct
<=	Is one thing LESS THAN OR EQUAL TO something else	14 <= 14	**TRUE** 14 is equal to 14, which is correct

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Logical or Boolean Operators.

Operator	Meaning	Example	Result
&& / AND	If Something **AND** Something is TRUE, the answer is TRUE	4 < 5 && 4 < 3	**FALSE**. 4 is not less than 3. Both statements have to be true.
|| / OR	If Something **OR** Something is TRUE, the answer is TRUE	4 < 5 || 4 < 3	**TRUE**. Only one has to be true, and 4 is less than 5.
! / NOT	If something is **NOT** true	4 < 5 AND !(4 < 3)	**TRUE**. Both sides are correct. Four is not less than 3.

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If Statements

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IF Statement

An **IF** statement is when there is a choice but no alternative.

For example, you are at the school canteen.

You can have Sauce or nothing on your hot dog.

There is no alternative.

This is when you use an **IF STATEMENT.**

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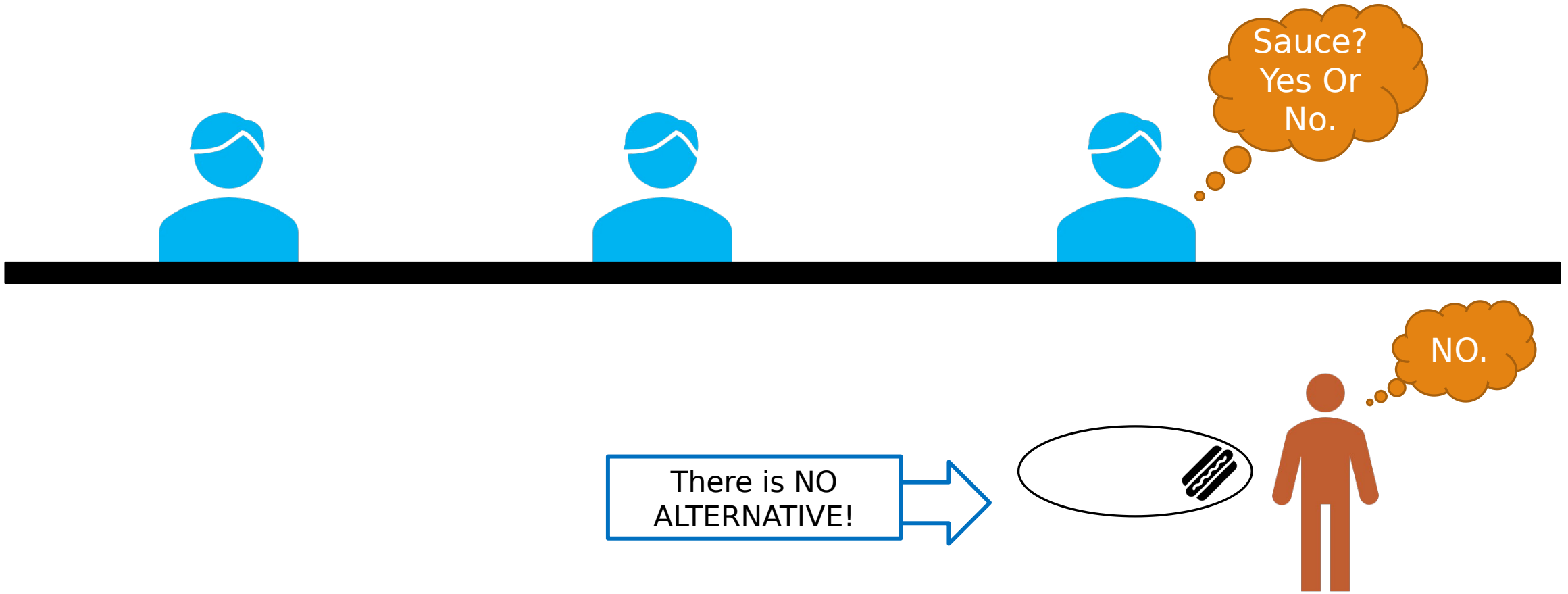
If Statement



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IF Statement – Single Condition Program

Write a program that will check to see if a number is less than zero.

It will print out “you cannot have a number less than zero”.

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TRY IT! C# Source Code

```
//declare a test number
int number = -1;

//if this statement is TRUE
if(number < 0)
{
    //Print out the message
    Console.WriteLine("You cannot have a number less than 0");
}
```

Create and assign a variable with a test number

Ask the question – is the number less than zero?

Only if the answer to the question is YES will this code run

Make sure you close your brackets properly

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Code Result

```
You cannot have a number less than 0
```

It worked!

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IF Statement – Single Condition

You can have as many operations as you like within the brackets.

You can run more code.

You can print out many messages.

The key is that your code will run everything you want, if the selection statement is **TRUE**.

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IF Statement Double Condition Program

Write a program that checks a number.

If the number is bigger than 5 **AND** less than 10 you will print out a message.

Print out “this number is between 5 and 10”.

This is how you program **BETWEEN** logic.

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TRY IT! C# Source Code

```
//declare a test number
int number = 6;

//if this statement is TRUE
if(number > 5 && number < 10)
{
    //Print out the message
    Console.WriteLine("Your number is between 5 and 10");
}
```

Create and assign a variable with a test number

Ask the question – is the number greater than 5 **AND** less than 10.

Notice you've got to use number **TWICE**

Make sure you close your brackets properly

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Code Result

```
Your number is between 5 and 10
```

It worked!

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IF Statement Pseudocode

```
IF number LESS THAN 50 THEN
  OUTPUT “less than 50”
END IF
```

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Class Task 4.12.3 - Programming

At your computer:

Try all of the programming tasks on your user input worksheet. Start with the easy ones until you get comfortable.

If you get stuck, check with your teacher, ask a classmate or check the answers provided.

TIME ALLOWED: 15 Minutes.

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If Statements In Other Languages

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IF Statement in C#

```
//declare a test number
int number = -1;

//if this statement is TRUE
if(number < 0)
{
    //Print out the message
    Console.WriteLine("You cannot have a number less than 0");
}
```

Create and assign a variable with a test number

Ask the question – is the number less than zero?

Only if the answer to the question is YES will this code run

Make sure you close your brackets properly

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IF Statement in Python

```
#declare a test number
number = -1

#if this statement is true
if(number < 0):
    #print out this message
    print("you cannot have a number less than 0")
```

Create and assign a variable with a test number

Ask the question – is the number less than zero?, don't forget the ':'

Only if the answer to the question is YES will this code run

Make sure you indent properly

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If Statement in VB.NET

```
'declare a test number
Dim number As Integer = -1
'if this statement is true
If number < 0 Then

 'print out the message
 Console.WriteLine("You cannot have a number less than 1")
End If
```

Create and assign a variable with a test number

Ask the question – is the number less than zero?

Only if the answer to the question is YES will this code run

Make sure you finish with End If

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Switch Case in VB.NET

```
Select Case numberVariable
```

This is asking “what is in the number variable”

```
  Case 1
       Console.WriteLine(“th
```

You do this if the value of the numberVariable is 1

```
  Case Else
    Console.WriteLine(“that"
End Select
```

Case Else is when value of numberVariable is not in the case list

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Language Comparison Summary

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Code Comparison

Function	C#	VB.NET	Python
Relational operator	>, <, ==, >=, <=, !=	>, <, =, >=, <=, <>	>, <, ==, >=, <= !=
Logical operator	&&, ||, !	AND, OR, NOT	AND, OR, NOT
If statement	IF(condition){}	If(condition)THEN END IF	IF(condition):

If else	If(condition){}
	Else{}
		If(condition)THEN
		ELSE
		END IF
			IF(condition):
			Else:

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Code Comparison

Function	C#	VB.NET	Python

If elseif else	`If(Condition1){}`
	`Else If(Condition2){}`
	`Else{}`
		`If(Condition1)Then`
		`ElseIf (Condition2) Then`
		`Else`
		`End If`
			`IF(condition1):`
			`Elif(condition2):`
			`else`

Switch	`Switch(condition)`
	`{`
	`Case 1:`
	`Default:`
	`}`
		`Select Case Condition`
		`Case 1`
		`Case Else`
		`End Select`
			Not Supported

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Self-Check: Lesson Review

- Can I explain the difference between the various selection statements?
- Can I program an If statement and use it correctly?
- Can I program an If..Else statement and use it correctly?
- Can I program an If..Else If..Else statement and use it correctly?
- Can I program a switch.. case statement and use it correctly?

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Further Reading

Websites

https://www.w3schools.com/cs/cs_conditions.php

https://www.w3schools.com/cs/cs_switch.php

https://www.tutorialspoint.com/csharp/if_else_statement_in_csharp.htm

Videos

https://www.youtube.com/watch?v=IzzNzSXkCMM

https://www.youtube.com/watch?v=y0HNk96vVLw

Textbook: pp 235 - 236

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